1-1-2016

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Recommended Citation
Schroeder, C. T., & Zeldes, A. (2016). Raiders of the Lost Corpus. *Digital Humanities Quarterly, 10*(2), https://scholarlycommons.pacific.edu/cop-facarticles/106

DHQ: Digital Humanities Quarterly
2016
Volume 10 Number 2

Raiders of the Lost Corpus

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Abstract

Coptic represents the last phase of the Egyptian language and is pivotal for a wide range of disciplines, such as linguistics, biblical studies, the history of Christianity, Egyptology, and ancient history. It was also essential for "cracking the code" of the Egyptian hieroglyphs. Although digital humanities has been hailed as distinctly interdisciplinary, enabling new forms of knowledge by combining multiple forms of disciplinary investigation, technical obtacles exist for creating a resource useful to both linguists and historians, for example. The nature of the language (outside of the Indo-European family) also requires its own approach. This paper will present some of the challenges -- both digital and material -- in creating an online, open source platform with a database and tools for digital research in Coptic. It will also propose standards and methodologies to move forward through those challenges. This paper should be of interest not only to scholars in Coptic but also others working on what are traditionally considered more "marginal" language groups in the pre-modern world, and researchers working with corpora that have been removed from their original ancient or medieval repositories and fragmented or dispersed.

The dry desert of Egypt has preserved for centuries the parchment and papyri that provide us with a glimpse into the economy, literature, religion, and daily life of ancient Egyptians. During the Roman period of Egyptian history, many texts were written in the Coptic language. Coptic is the last phase of the ancient Egyptian language family and is derived ultimately from the ancient Egyptian hieroglyphs of the pharaonic era. 1

Digital and computational methods hold promise for research in the many disciplines that use Coptic literature as primary sources: biblical studies, church history, Egyptology, linguistics, to name a few. Yet few digital resources exist to enable such research. This essay outlines the challenges to developing a digital corpus of Coptic texts for interdisciplinary research — challenges that are both material (arising from the history and politics of the physical corpus itself) and theoretical (arising from recent efforts to digitize the corpus). We also sketch out some solutions and possibilities, which we are developing in our project Coptic SCRIPTORIUM. 2

Digital Humanities has defined itself as a field that can enable research on a new scale, whether distant reading of large text corpora, aggregation of large visual media collections, or enabling discovery in future querying and algorithmic research [Moretti 2013] [Greenhalgh 2008] [Witmore 2012]. Critical Digital Humanities scholars remind us that digitization initiatives sometimes replicate the Western canon rather than expand it, and that digitization is not in and of itself a more equitable mode of scholarship existing outside of politics [Wernimont 2013] [Wilkins 2012]. Digital tools and corpora for Coptic language and literature, we argue, can expand humanistic research not merely in terms of scale but also scope, especially in ancient studies and literature. Large English, Greek, and Latin corpora — as well as the tools to create, curate, and query them — have been foundational for work in the Digital Humanities. Computational studies on the documents from late antique Egypt can facilitate academic inquiry across traditional disciplines as well as transform our canon of Digital Classics and Digital Humanities scholarship. 3

Part I: Shenoute of Atripe and the Scriptorium of Doom

Of the several dialects of Coptic that developed in late antiquity, the Sahidic dialect is considered the early classical dialect. Much of the surviving Coptic literature in Sahidic comes from one important late antique repository: the White 4

Monastery in Egypt. One of the most important Egyptian monasteries of the fourth through 12th centuries, it is also known as the Monastery of Shenoute, named after the monk who was the father, or abbot, of the community from the 380s until his death in 465. During Shenoute’s life, the large basilica (the community’s church building) was constructed; over the centuries it was damaged, restored, and changed, but the basic design and construction are from Shenoute’s tenure in the fifth century.

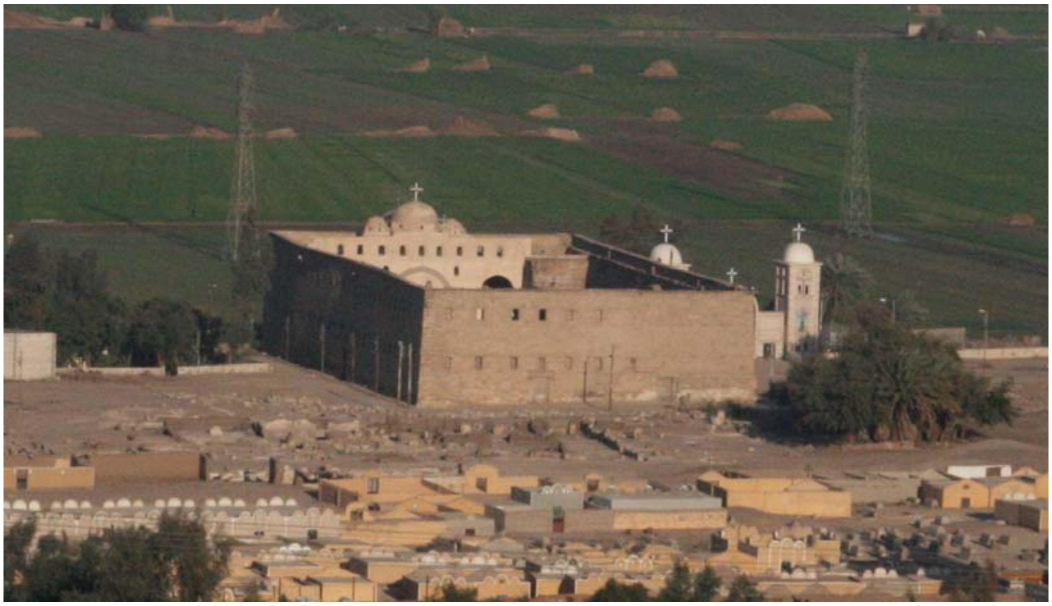


Figure 1. Basilica of the White Monastery; photograph by Schroeder, 2012

This community is often called the White Monastery, because of the color of the stone used to build the church. Some of the blocks used to construct the basilica were taken from the nearby pagan temple of Repyt (Triphis). Shenoute is the most famous and most important leader of this monastic community, propelling it to a position as a political and cultural center in Upper Egypt. 5

This monastery’s scriptorium and library were arguably the most influential in the region. Important copies of biblical books and monastic texts written or translated into Coptic have survived [Orlandi 2002] [Emmel and Römer 2008]. Shenoute received letters from the bishop of Alexandria, which were translated into Coptic and circulated throughout the area. Shenoute himself is our most important and probably most rhetorically sophisticated Coptic author [Shisha-Halevy 1986]. And he is particularly known for his stark, prophetic rhetoric in which he condemns sinners, heretics, and others for their failures and predicts the coming of God’s wrath upon them [Schroeder 2006] [Brakke 2007]. The White Monastery, therefore, is one of our most important repositories of Coptic literary manuscripts, and its corpus provides important insights into the religious history of Christian Egypt. 6

For linguists and Egyptologists, Coptic’s significance lies in its position as the last phase of the Egyptian language family. Egyptian evolved over thousands of years from the third and fourth millennia BCE through the Byzantine era, encompassing Old and Middle Egyptian hieroglyphs of the pharaonic periods as well as Coptic. Because of this connection to ancient Egyptian hieroglyphs, Egyptologists, including Jean-François Champollion, used their knowledge of Coptic to translate the hieroglyphs after the discovery of the Rosetta Stone (e.g., see [Champollion 1824]; [Hamilton 2006]; [Robinson 2012]). Coptic is written primarily in the Greek alphabet, with some modified Demotic characters. (Demotic is the Egyptian script used increasingly during the Hellenistic period, and it preceded Coptic as a written language in Egypt.) The language, therefore, could be loosely understood by the non-specialist as a language of transliteration: Egyptian grammar and vocabulary written primarily in the Greek alphabet (with some native Egyptian letters-Demotic-included). Figure 3 is a transcription of the detail of the Coptic manuscript in Figure 2. The letters rendered in red in Figure 4 derive from the Demotic (Egyptian) alphabet. Some Greek (and to a lesser extent Latin) vocabulary words were incorporated into the language, and after the Arab conquest, some Arabic loanwords came into the language, as well. The Greek loan word *akathartos* appears in blue in Figure 3. A digital Coptic language corpus would be a resource for research by linguists and Egyptologists alike. 7

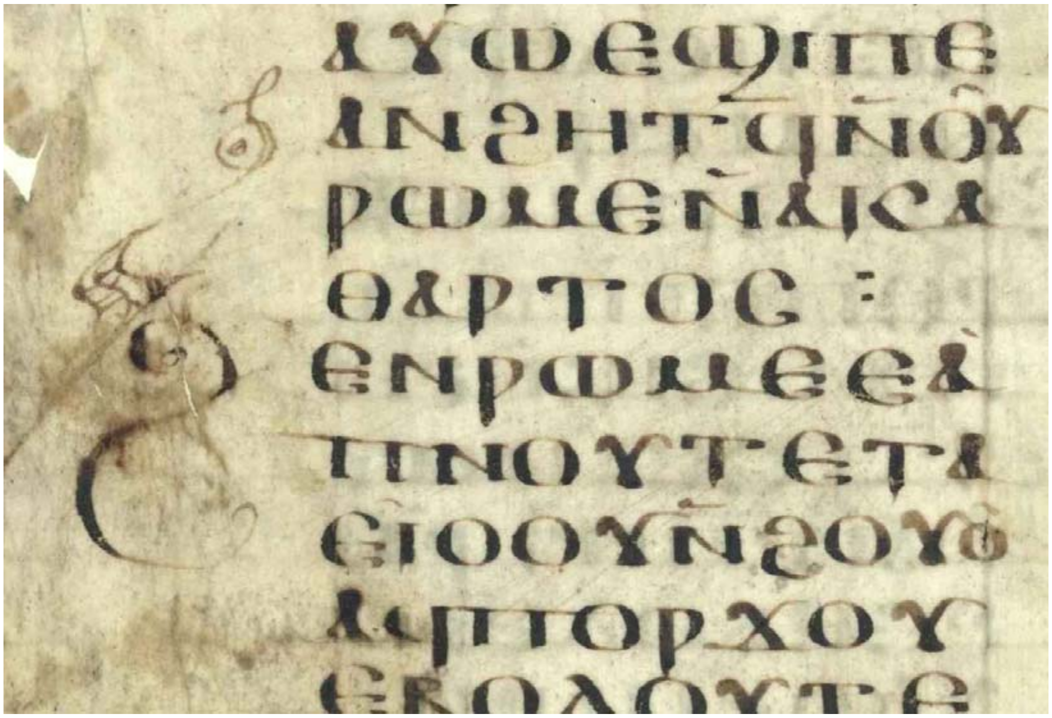
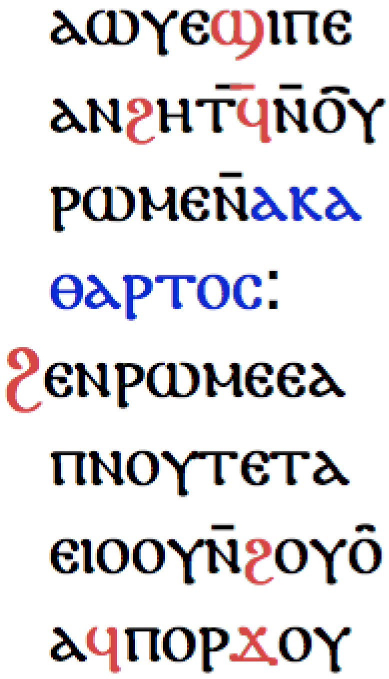


Figure 2. Detail of manuscript K9662 from the Österreichische Nationalbibliothek, Vienna, Papyrussammlung (Shenoute n.d.)



ⲁⲱⲩⲉϣⲓⲡⲉ
ⲁⲛϩⲏⲧ̄ϥ̄ⲛ̄ⲟ̂ⲩ
ⲣⲱⲙⲉⲛ̄ⲁⲕⲁ
ⲑⲁⲣⲧⲟⲥ:
ϩⲉⲛⲣⲱⲙⲉⲉⲁ
ⲡⲛⲟⲩⲧⲉⲧⲁ
ⲉⲓⲟⲟⲩⲛ̄ϩⲟⲩⲟ̂
ⲁϥⲡⲟⲣϫⲟⲩ

Figure 3. Transcription of detail of ONB manuscript K9662; Demotic characters in red, Greek word in blue.

8 Coptic is also important for Biblical studies, including extra-canonical texts. Many biblical manuscripts survive in various Coptic dialects, including important witnesses in Sahidic from the White Monastery. Shenoute of Atripe is also one of our earliest Coptic authors to cite and quote the bible, providing early evidence as to how the bible was used and interpreted in fourth and fifth century Egypt. Some of our most important extra-canonical texts, including the so-called "Gnostic" library from Nag Hammadi, survive in Coptic. The Nag Hammadi corpus includes philosophical treatises but

also a number of extra-canonical Gospels, apocalypses, and other early Christian texts that are fundamental to our understanding of Christian origins. The Gospel of Thomas, shown in Figure 4, is one of the most famous of those texts.

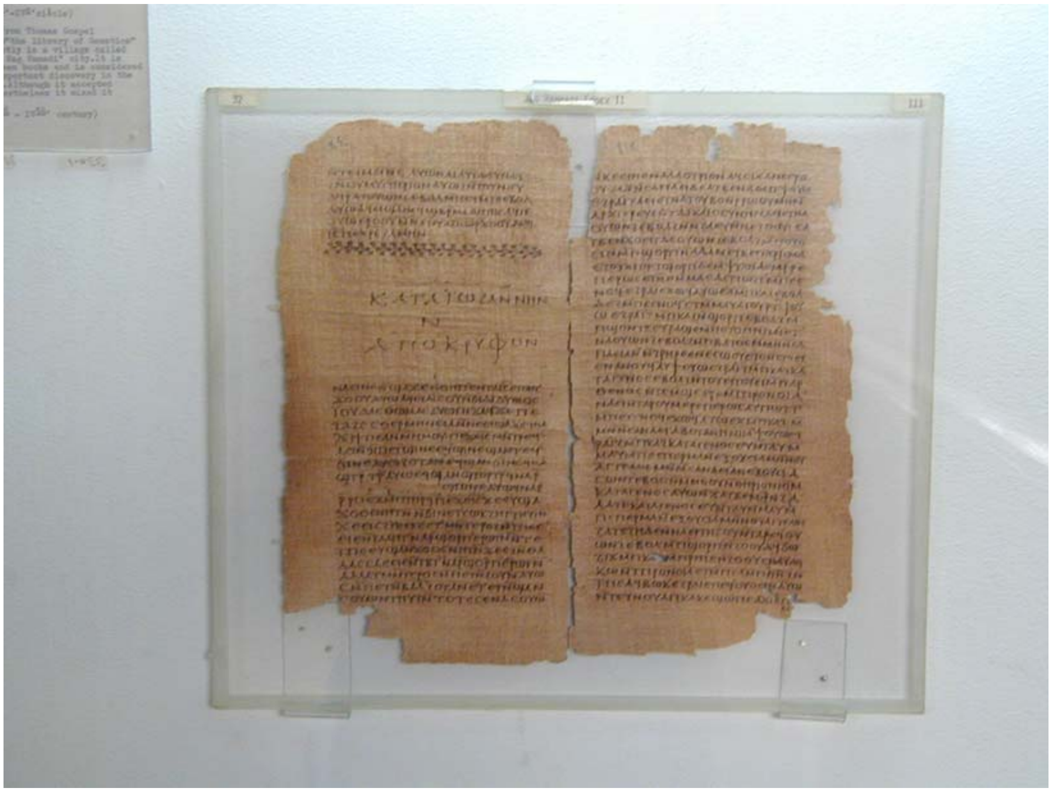


Figure 4. Pages from the Nag Hammadi Library, containing the end of the Apocryphon of John and beginning of the Gospel of Thomas; in the Coptic Museum, Cairo; photograph by Schroeder 2002

Coptic literature documents the beginnings of the monastic movement, as well. Egypt became one of the cradles of early Christian monasticism when in the fourth century, men and women flocked to Egypt to become monks, and of course Egyptian men and women themselves became monks. Perhaps the most famous of these was Anthony the Great, who lived in a cave in the desert cliffs depicted in or in the region of those depicted in Figure 5. Monastic settlements dotted the Nile Valley from the fourth through eighth centuries. 9

Figure 5. Cliffs behind the monastery of Saint Anthony by the Red Sea; photograph by Schroeder, 2008

Thus, Coptic literature is an important primary source for multiple academic disciplines, and we haven't even addressed social and economic history. Countless documentary papyri and ostraca survive, some of which are beginning to be digitized by scholars at http://papyri.info. Ostraca are pot sherds on which people wrote letters, receipts, and other 10 documents. We have thousands upon thousands of Coptic ostraca, many of which are undocumented and unpublished, with more being discovered all the time.

The White Monastery is arguably the most important ancient repository for Coptic texts in the Sahidic dialect and more generally for understanding early Christian monasticism. The community remained a literary powerhouse through at least the twelfth century, accumulating, transcribing, and storing a wide variety of texts. Documents from Byzantine Egypt mention people sending requests and even visiting this monastery's library to obtain copies of various documents. It contains the largest, earliest collection of contemporaneous, non-hagiographical texts documenting a coenobitic monastery. We have letters, monastic rules, treatises and discourses from Shenoute and at least his next two successors, comprising a corpus larger than that of any other fourth or fifth century monastery. These documents date to a period earlier than the Benedictine material in Italy and Europe, and they comprise a less-hagiographical (and thus more historical) source than more well-known documents about Egypt's "desert fathers" and "desert mothers," such as saints lives about famous monks, or the *Sayings of the Desert Fathers* [Gregg 1980] [Veilleux 1980] [Ward 1975] [Wortley 2014]. When the monastery's library was "discovered" in modernity, its documents transformed the study of the Coptic language and informed our understanding of the entire Egyptian language family [Emmel and Römer 2008]. 11

Part II: Coptic Egypt and the Last Crusade

In the 18th and 19th centuries, when Europe colonized Egypt and Africa, Europe discovered the White Monastery library. By this time, the monastery was barely populated, and Arabic had taken over as the popular language of Egypt. Even the Coptic liturgies and bibles were in Arabic, not Coptic. The Coptic manuscripts, once part of the most important library in the region, were no longer legible to the Egyptian people, and they were dispersed to libraries, museums, and private collections elsewhere, primarily Europe. 12

The actual history of the dismemberment of the library is not completely known, but we do know that in the 18th c., pieces of this library were on the antiquities market. Whether taken by European traders or offered up by Egyptian Christians at the monastery, we don't know for sure. But our first record of White Monastery manuscripts leaving Egypt for Europe is their acquisition by the Borgias in Italy in 1778. Most of the last of the manuscripts were found by the French scholar Gaston Maspero in a small room, essentially discarded by people who no longer knew Coptic, and were taken to Paris [Orlandi 2002]. 13

Today, the manuscripts are scattered across the globe. Only a handful remain in Egypt. The largest collections are in Naples, Vienna, Paris, and England. The map in Figure 6 shows only the locations of manuscripts of Shenoute's writings. Not where all the biblical texts are located, nor liturgical, hagiographical, and other White Monastery texts. Including all the known White Monastery manuscripts would add to the number of modern repositories on this map. Of course, we do not know the number of documents (whether fragments or whole codices) that exist in private collections. 14

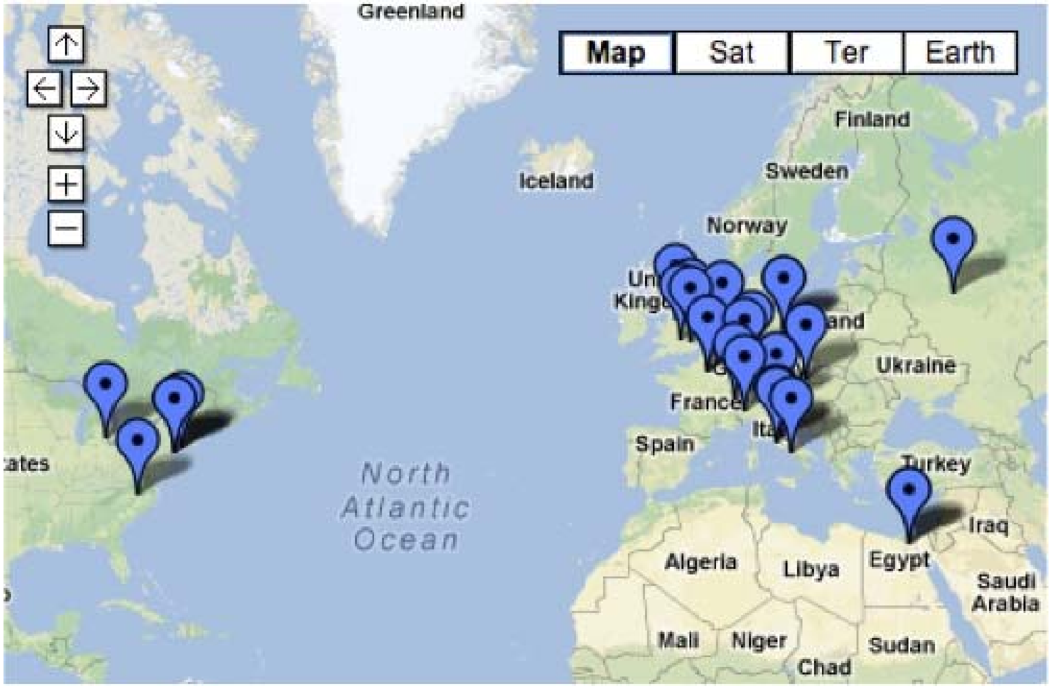


Figure 6. Map of known locations of manuscripts of Shenoute's texts; data from codicological reconstruction by Stephen Emmel (2004); map created by Schroeder at http://goo.gl/c3uaM6

15 The texts were dispersed page by page, not codex by codex. Thus, the pages of one original codex might now be all over the globe. Figure 7 is a page from a copy of Volume Three of Shenoute’s *Canons* for monks; many other folios from his corpus are similarly damaged or fragmented. The chart in Figure 8 illustrates the dispersal of the manuscripts of one text — not a codex but one text — known as *Abraham Our Father*, which is a letter to monks in Volume Three of Shenoute's *Canons*. Folios survive from a few copies of *Canons* vol. 3, so this pie chart represents pages from 6 separate codices. Though six repositories are represented in the chart, each codex's pages went to different repositories. And there are gaps; the text does not survive in entirety even after piecing together all the surviving folios.

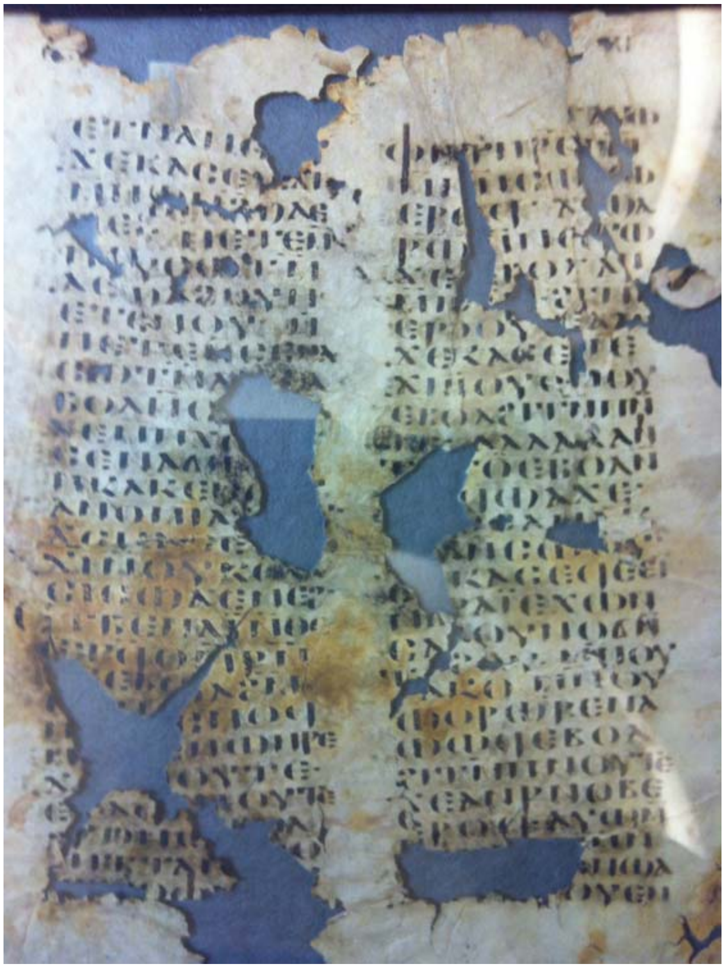


Figure 7. Damaged folio from Volume 3 of Shenoute's *Canons* for monks at the Bodleian Library, Oxford; photograph by Schroeder 2012

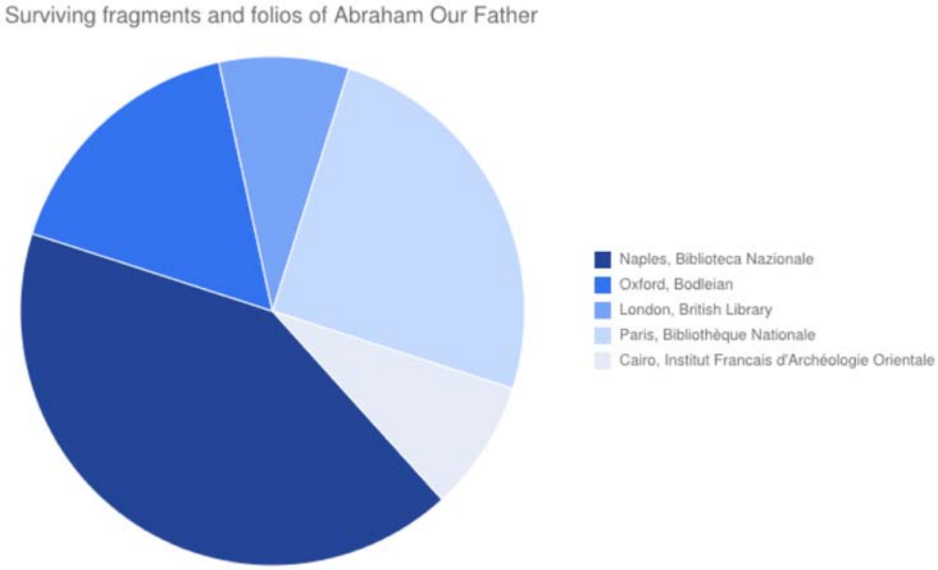


Figure 8. Locations of known, extant folios of *Abraham Our Father*

Less than 50% of Shenoute's corpus survives. Of the entire library, the percentage is probably similar, but we don't know for sure. 16

Part III: The Corpus Strikes Back

One challenge with this level of corpus dismemberment is access: how can we access these texts and understand them with both depth and breadth? What will it require to develop and curate a Coptic corpus suitable for cross-disciplinary, digital and computational research? Some of the challenges to developing a cross-disciplinary digital Coptic research environment include: 17

- Digitization and copyright
- The patchwork nature of public domain editions
- The need for field-wide standards for stable universal references for documents
- Integrating technologies for linguistic, historical, and codicological research
- The need for semi-permanent archives for corpora, akin to the Perseus Digital Library

Despite the situation of the manuscripts, the late nineteenth and early twentieth centuries saw flurries in the publication of Coptic literary texts: biblical texts, hagiography, liturgy, monastic texts, and others. Issues of access, however, endure. Many texts remain unpublished in whole or in part, and even more are untranslated. In the case of Shenoute's writings, it was not even until 1993 that a scholar pieced together all the dispersed manuscripts in a codicological reconstruction, enabling various scholars to read all the known surviving pages of any one given text by our most important Coptic author outside of the bible [Emmel 2004]. 18

Copyright and editorial issues also exist. The publication status of Coptic texts is a patchwork, with some texts partially published and partially unpublished due to the dispersal of their original manuscripts in multiple repositories. Some publications are now in the public domain, while others are not. Often, only one publication of any given manuscript exists. (And by manuscript, we refer to the segmented pieces of codices, not entire codices.) Some older, public domain editions are also regarded as problematic by current scholars. 19

Scholars working in Greek and Latin face similar obstacles in digitizing sources, in that many desirable editions are under copyright. However, in Classics, often there are multiple published editions of any given text, with at least one of them being in the public domain. The Perseus Digital Library (http://www.perseus.tufts.edu) publishes online previous print, public domain editions. This model works for Classical texts but is not sufficient for Coptic literature, because of the different nature of the sources. 20

Additionally, since the manuscripts themselves have been dismembered, scholars cannot rely upon a given repository and community of librarians to digitize a vital text. 21

Going back to the original manuscripts for digitization is desirable for basic reasons of scholarship and to provide a digital-native text that is not created from published editions still under copyright. Digitizing the manuscript and encoding all the line breaks, column breaks, page breaks, punctuation, diacritics, and other markings enables the study of many aspects of the language and literature. But it is also time consuming, especially when encoding texts that have not been studied thoroughly, or perhaps have never been translated into a modern language, or even published. 22

Some existing digital Coptic resources include: 23

- Digital editions of documentary papyri and ostraca at http://papyri.info. Papyrologists are beginning to expand this predominantly Greek collection into Coptic using the EpiDoc subset of the Text Encoding Initiative XML standards [Elliott et al. 2006] and the Unicode Coptic character set.
- The Thesaurus Linguae Aegyptiae plans to expand into the Coptic dialects at http://aaew.bbaw.de/tla/ (subscription required, free to scholars) [TLA 2014]
- The Corpus dei Manuscritti Copti Litterari project encodes Coptic text in html, sgml, with legacy fonts at http://cmcl.aai.uni-hamburg.de/ (subscription required) [CMCL]
- A searchable Bible in the Unicode Coptic character set is in progress at http://www.crosswire.org/study/fulllibrary.jsp?show=SahidicBible [Askeland n.d.].
- Some Sahidic New Testament manuscripts at the New Testament Virtual Manuscript Room, which concentrates on Greek at http://ntvmr.uni-muenster.de/ [NTVMR]
- The Marcion project (http://marcion.sourceforge.net/), established primarily to study Gnostic texts from the Nag Hammadi Library, has searchable text and a dictionary which are primarily accessible only through

software that requires installation on one’s computer.

A few resources are available commercially. 24

The field currently has no generally accepted set of data curation standards for metadata or textual data for Coptic literature. Stable, field-recognized identifiers and digital citation methods for Coptic literature still do not exist. As Joel Kalvesmaki has argued, canonical referencing is complex for text collections with such complicated histories and provenance issues [Kalvesmaki 2014]. The Trismegistos portal provides unique identifiers for various ancient text-bearing objects, but more work remains to be done [Trismegistos]. Existing publications do not even use a common word segmentation practice for printing Coptic text. Only open, collaborative work among various scholars and across digital Coptic projects will ensure that each digital Coptic project does not develop its own unique protocols and datasets that are not applicable for multiple research questions, or that are not readable or transferrable across projects. 25

Martin Mueller’s keynote lecture at the 2012 Chicago Colloquium on Digital Humanities and Computer Science noted philology’s tendency toward perfectionism [Mueller 2012]. Philologists' resistance to releasing editions "too soon" bumps up against the digital scholarly world’s impulses to release data openly and swiftly, in order to increase access to texts. The ability to edit and annotate a digital corpus resolves some of these anxieties, provided that the technology of the environment for the corpus enables revisions. An example of such a corpus is the Papyri.info site, where the Papyrological Editor enables further edits and refinements. 26

The recent controversy over the so-called *Gospel of Jesus’s Wife Fragment* demonstrates the necessity for an open, well-curated, and annotated digital Coptic corpus. Harvard University announced the discovery of a papyrus fragment containing a small portion of a Coptic literary text containing the terms "Mary," "Jesus," and "my wife" in September 2012, and a slew of media fanfare followed, including a front-page story in the *New York Times* [Goodstein 2012]. The primary questions were: is this document an authentic ancient text and does it provide evidence that Jesus was married — possibly to Mary Magdalene? — or at least that a particular early Christian group wrote about Jesus marrying Mary Magdalene [Le Donne 2013]? For two years, scholars debated the authenticity of the fragment, examining the vocabulary, syntax, and handwriting. Similarities to vocabulary in the Nag Hammadi Library were noted, although the grammar of the Coptic in the fragment struck some scholars as inauthentic very early in controversy [Robinson and Halton 2012] [Čéplö 2012]. And since the fragment appeared on a small piece of papyrus, it seemed possible the text could be an amulet, spell, or prayer fragment. 27

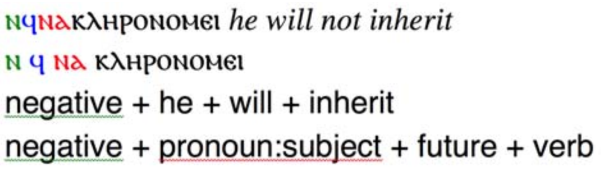
Immediately, the potential for analyzing the document against digital corpora curated for Coptic’s particular language structure and annotated linguistically became apparent. The lack of such corpora meant that only one scholar made such an attempt, using a widely circulating digital version of the Sahidic New Testament gospels and the Nag Hammadi Library’s Gospel of Thomas [Čéplö 2012]. These digitized texts, however, however, contain many irregularities in spelling and word segmentation, and are not annotated. While helpful, they could not be called well-curated nor comprehensive. Scholarly debate over the authenticity of the fragment continued, focusing on traditional methodologies of studying ink, papyrus, handwriting, and grammar, in blogs, social media, and traditional scholarly outlets [Goodacre 2014b] [Goodacre 2014a] [King 2014a] [Choat 2014] [Yardley and Hagadorn 2014] [Azzarelli, Goods, and Swagger 2014] [Hodgins 2014] [Tuross 2014] [Depuydt 2014] [King 2014b]. Finally Coptic scholar Christian Askeland determined the text was indeed a modern forgery, since another document using the same ink and written in the same hand was also forged. He published his results in a blog post and later a traditional article [Askeland 2015]. Traditional scholarly methodologies informed this debate, but open access corpora and images would have accelerated the findings and would have allowed for testing of hypotheses speculated between 2012 and 2014. 28

Part IV: A New Hope

A richly annotated corpus of digital Coptic literary texts in an open-access environment, with well curated metadata, and which adheres to existing digital and traditional field-based standards, enables the exploration of the multidisciplinary research areas we have described. Such work requires tools to process and annotate Coptic text, a search and visualization infrastructure, and community-based standards. Coptic SCRIPTORIUM is developing such tools and technologies, plus a digitized corpus created with these tools. 29

To create a digital corpus of Coptic texts suitable to automated search and other digital and computational methods, 30 new technologies must be developed specifically for processing the Coptic language, and existing technologies must be adapted. Such technologies include:

- **Character converters** to convert text visualized as Coptic characters using legacy fonts into the Unicode Coptic character set. Many scholars have existing digitized Coptic text on their computers, which could contribute to a large collaborative corpus. But the transcriptions are in legacy fonts, which need to be converted into Unicode (UTF-8) characters.
- A **tokenizer** to break up Coptic word groups into their constituent, grammatical parts. The Coptic language is agglutinative. Words are in fact bound groups of morphemes, each with its own grammatical purpose. Figure 9 gives one example from the text, *Abraham Our Father*, by Shenoute:

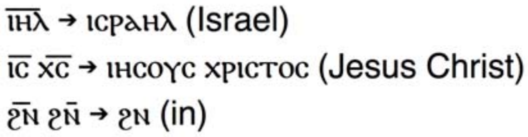


ⲛϥⲛⲁⲕⲗⲏⲣⲟⲛⲟⲙⲉⲓ *he will not inherit*
ⲛ ϥ ⲛⲁ ⲕⲗⲏⲣⲟⲛⲟⲙⲉⲓ
negative + he + will + inherit
negative + pronoun:subject + future + verb

Figure 9. Example of a Coptic "bound group" of morphemes from *Abraham Our Father*

There is no universal, uniform method of word segmentation in Coptic; different scholars have followed different guidelines. The emerging standard in the United States is currently that of Bentley Layton, in his Coptic Grammar [Layton 2011]. In Germany, however, some scholars follow the paradigm established by Walter Till [Till 1960]. Tokenizing Coptic is essential for linguistic study, since each morpheme needs its own part-of-speech annotation. Historical research using basic vocabulary searches also requires tokenization. Finally, more complex research into style and rhetoric, authorship attribution of unidentified texts, and searching for text reuse and quotation (especially using algorithms to search for biblical citations) demand a tokenized text 31

- A **normalizer** to standardize spelling of Coptic words and remove or standardize diacritics and punctuation. Normalization of spelling is essential for search, and often for further machine-enabled annotation. Some tools to annotate the text automatically or semi-automatically rely on consistent spelling of terms. Issues include spelling variants due to geographical practices, scribal inconsistencies or idiosyncrasies; expansion of scribal abbreviations for nomina sacra; differing practices across manuscripts for diacritical marks such as supralinear strokes or circumflexes. Figure 10 provides examples of abbreviations to be expanded and diacritics removed:



ⲓ̅ⲏ̅ⲗ̅ → ⲓⲥⲣⲁⲏⲗ (Israel)
ⲓ̅ⲥ̅ ⲭ̅ⲥ̅ → ⲓⲏⲥⲟⲩⲥ ⲭⲣⲓⲥⲧⲟⲥ (Jesus Christ)
ϩ̅ⲛ ϩⲛ̅ → ϩⲛ (in)

Figure 10. Normalization examples

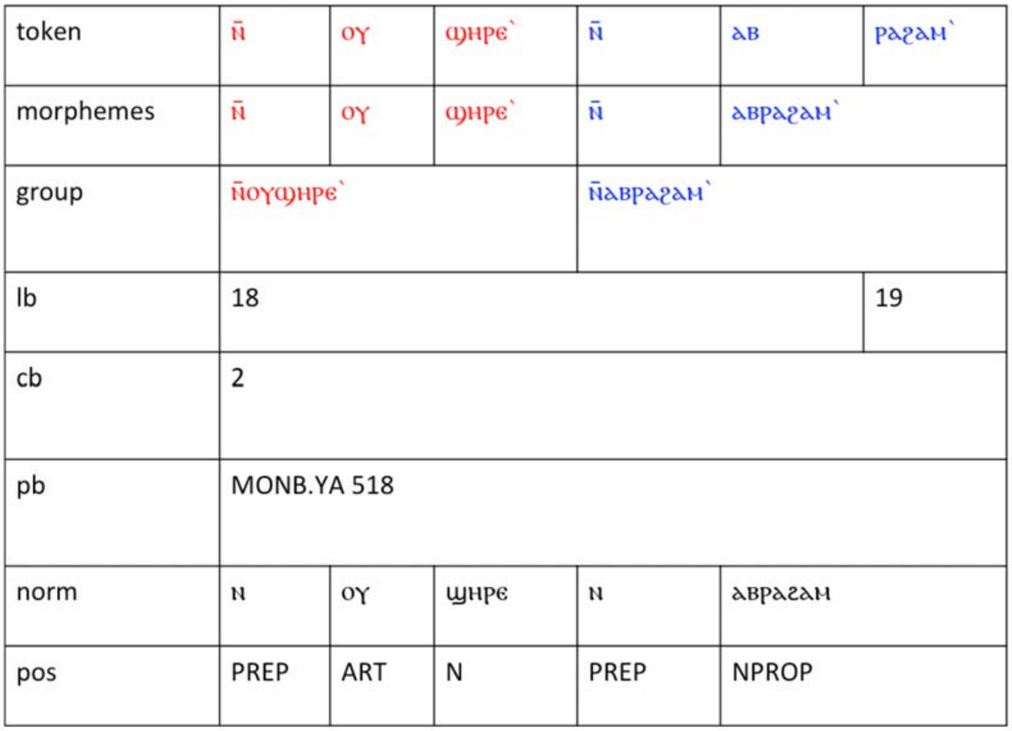
- TEI XML [TEI] **annotation standards**, specifically the EpiDoc subset, to markup the diplomatic transcription of texts and their metadata. Encoding standards developed by the Text Encoding Initiative [TEI] and especially the EpiDoc subset used by epigraphers and papyrologists [Elliott et al. 2006] can be adapted for Coptic literary manuscripts. Metadata and paleographical information can be encoded.

Other existing, community standards used in both digital and print scholarship can be adapted, as well. Trismegistos numbers from the Trismegistos database of ancient texts and texts-bearing objects should be included in metadata to enable linked data across digital projects [Trismegistos]. For works specifically in Coptic, the CMCL abbreviations for manuscript codices (e.g., MONB.YA = White Monastery manuscript YA) and Clavis Coptica for authors and texts are existing standards [Clavis Patrum Copticorum] [Suciu 2012]. For texts by Shenoute, the incipits and abbreviations for texts developed by Stephen Emmel in *Shenoute's Literary Corpus* should be used for metadata [Emmel 2004]. The field still needs a system for Uniform Resource Names (URNs) and other more refined citation methods for curating digital 32 data and documents — especially given the dismembered nature of the corpus, and that some pieces of the corpus may be published in born-digital formats while others may be adapted from previously published editions.

Tools to annotate or mark up the digitized, curated text enable search and computational research methods for work in a variety of disciplines need to be developed. We know of no other open source tools to annotate digital texts in the Egyptian language family. SCRIPTORIUM is working on the following technologies 33

- A **Part-of-Speech tagger** automatically annotates Coptic morphemes according to the linguistic conventions established in Layton's *Coptic Grammar* (the field standard), enabling research into linguistics and style. It uses the trainable TreeTagger natural language processing tool [Schmid 1994].
- A **lemmatizer** can automatically annotate various forms of a word to the standard, dictionary headword. The lemmatizer will enable linking data to online lexica either at SCRIPTORIUM or elsewhere on the web.
- A **language-of-origin tagger** automatically annotates words of Greek, Hebrew, Latin, or other non-Egyptian language origin, enabling research into loan words, language contact, and bilingualism.
- Entity taggers to annotate digital corpora for people and places to connect literary data with linked open data initiatives such as PELAGIOS for geographic locations in the ancient world and SNAP on ancient prosopography are also desirable [Anon 2014] [SNAP:DRGN]

At Coptic SCRIPTORIUM textual annotations are made using multi-layer and standoff markup [Carletta, Evert, Heid, Kilgour, Robertson, and Voorman 2003] [Dipper 2005], which can capture the variety of annotations: linguistic, paleographic, philological, etc. The token layer is the base layer of data, the smallest unit of data annotated, as seen in Figure 11, which shows the annotation of two bound groups (one in red, one in blue), which translate into "of a son of Abraham": 34



token	ⲛ̄	ⲟⲩ	ϣⲏⲣⲉ`	ⲛ̄	ⲁⲃ	ⲣⲁϩⲁⲙ`
morphemes	ⲛ̄	ⲟⲩ	ϣⲏⲣⲉ`	ⲛ̄	ⲁⲃⲣⲁϩⲁⲙ`	
group	ⲛ̄ⲟⲩϣⲏⲣⲉ`			ⲛ̄ⲁⲃⲣⲁϩⲁⲙ`		
lb	18					19
cb	2					
pb	MONB.YA 518					
norm	ⲛ	ⲟⲩ	ϣⲏⲣⲉ	ⲛ	ⲁⲃⲣⲁϩⲁⲙ	
pos	PREP	ART	N	PREP	NPROP	

Figure 11. Example of multilayer, standoff markup of Coptic text from *Abraham Our Father*

The layers provide data for the morphemes, the bound group, the line number in which the text appears in the original manuscript (lb, following the TEI/EpiDoc standard), the column in which the text appears in the original manuscript (cb), the page on which the text appears in the original manuscript (pb, in which MONB.YA is the siglum for White Monastery codex YA as designated by the CMCL standards), the normalized morphemes, and the part of speech tags for the normalized morphemes (PREP=preposition, ART=article, N=noun, NPROP=proper noun). 35

SCRIPTORIUM provides the means to search the multiple layers of data in various combinations, including in conjunction with metadata. We use the open-source search and visualization tool ANNIS [Zeldes, Ritz, Lüdeling, and Chiarcos 2009]. ANNIS contains built-in visualization capabilities and can be customized for each corpus. Coptic SCRIPTORIUM has embedded a Coptic keyboard, a web font for Coptic Unicode characters, and various visualizations of the data. All the tools and corpora discussed in this essay are available at http://www.copticscriptorium.org. 36

The multilayer architecture allows for multidisciplinary research [Krause and Zeldes 2014]. Historians may be interested in vocabulary searches on the normalized words. Linguists may query the parts of speech for computational morphological and syntactic research. Scholars working on ancient prosopography or network analysis may search for named entities. Additional layers may be added if other researchers wish to annotate the corpora for other research questions. Since all data documents are licensed with Creative Commons Attribution licenses, philologists and paleographers who wish to publish their own digital editions of manuscripts may download, modify, and annotate or re-annotate our XML documents for their own work as long as they provide attribution to the source. 37

The community of Coptic scholars is small, but the impact of our work ripples out into many fields. The true hope for digital scholarship in the Coptic language and literature lies beyond our individual efforts and in the community of Coptic scholars within and outside the academy: scholars who digitize texts, write annotations, inspire and develop new technologies, conduct research using the platform, and contribute to the evolving standards. 38

Works Cited

Anon 2014 Anon, Pelagios: Enable Linked Ancient Geodata In Open Systems. Available at: http://pelagios-project.blogspot.com/ [Accessed May 19, 2014].

Askeland 2015 Askeland, C., 2015. "A Lycopolitan Forgery of John’s Gospel". *New Testament Studies*, 61(03), pp.314–334.

Askeland n.d. Askeland, C., Schulz, M. & Griffitts, T., "The Bible Tool: Sahidic Bible" - Askeland/Schulz. Available at: http://www.crosswire.org/study/fulllibrary.jsp?show=SahidicBible [Accessed October 21, 2014].

Azzarelli, Goods, and Swagger 2014 Azzarelli, J.M., Goods, J.B. & Swager, T.M., 2014. "Study of Two Papyrus Fragments with Fourier Transform Infrared Microspectroscopy". *Harvard Theological Review*, 107(02), pp.165–165.

Brakke 2007 Brakke, D., 2007. "Shenoute, Weber, and the Monastic Prophet: Ancient and Modern Articulations of Ascetic Authority". In *Foundations of Power and Conflicts of Authority in Late-Antique Monasticism: Proceedings of the International Seminar in Turin, December 2-4, 2004*. Orientalia Lovaniensia Analecta. Leuven: Peeters.

CMCL CMCL, Corpus dei Manoscritti Copti Letterari. *CMCL - Studies in Coptic Civilization*. Available at: http://cmcl.aai.uni-hamburg.de/ [Accessed September 11, 2012].

Carletta, Evert, Heid, Kilgour, Robertson, and Voorman 2003 Carletta, J., Evert, S., Heid, U., Kilgour, J., Robertson, J. & Voormann, H. 2003. "The NITE XML toolkit: Flexible annotation for multi-modal language data". *Behavior Research Methods, Instruments, and Computers* 35(3), 353–363.

Champollion 1824 Champollion, Jean-François. *Précis du système hiéroglyphique des anciens Égyptiens*. Paris: Treuttel et Würtz, 1824.

Choat 2014 Choat, M., 2014. "The Gospel of Jesus’s Wife: A Preliminary Paleographical Assessment". *Harvard Theological Review*, 107(02), pp.160–162.

Clavis Patrum Copticorum "Clavis Patrum Copticorum, CMCL - Clavis Patrum Copticorum". Available at: http://cmcl.aai.uni-hamburg.de/chiam_clavis.html [Accessed October 21, 2014].

Depuydt 2014 Depuydt, L., 2014. "The Alleged Gospel of Jesus’s Wife: Assessment and Evaluation of Authenticity". *Harvard Theological Review*, 107(02), pp.172–189.

Dipper 2005 Dipper, S. 2005. "XML-based stand-off representation and exploitation of multi-level linguistic annotation". In *Proceedings of Berliner XML Tage 2005 (BXML 2005)*. Berlin, Germany, pp. 39–50.

Elliott et al. 2006 Elliott, T. et al., 2006. "EpiDoc: Epigraphic Documents in TEI XML". Available at: http://epidoc.sf.net/ [Accessed September 11, 2012].

Emmel 2004 Emmel, S., 2004. *Shenoute’s Literary Corpus*, Louvain: Peeters.

Emmel and Römer 2008 Emmel, S. & Römer, C.E., 2008. "The Library of the White Monastery in Upper Egypt/Die Bibliothek des Weißen Klosers in Oberägypten". In *Spätantike Bibliotheken: Leben und Lesen in den frühen Klöstern Ägyptens*. Nilus: Studien zur Kultur Ägyptens und des Vorderen Orients. Vienna: Phoibos Verlag, pp. 5–25.

Goodacre 2014a Goodacre, M., 2014a. "Jesus' Wife Fragment: Another Round-Up". *NT Blog*. Available at: http://ntweblog.blogspot.com/2014/05/jesus-wife-fragment-another-round-up.html [Accessed July 22, 2015].

Goodacre 2014b Goodacre, M., 2014b. *Jesus' Wife Fragment Round-up*. *NT Blog*. Available at: http://ntweblog.blogspot.com/2014/05/jesus-wife-fragment-round-up.html [Accessed July 22, 2015].

Goodstein 2012 Goodstein, L., 2012. "Historian Says Piece of Papyrus Refers to Jesus' Wife". *The New York Times*. Available at: http://www.nytimes.com/2012/09/19/us/historian-says-piece-of-papyrus-refers-to-jesus-wife.html [Accessed July 22, 2015].

Greenhalgh 2008 Greenhalgh, M., 2008. "Art History". In S. Schreibman, R. Siemens, & J. Unsworth, eds. *A Companion to Digital Humanities*. Malden, Mass.: John Wiley & Sons, pp. 31–45.

Gregg 1980 Gregg, R.C. ed., 1980. *Athanasius : The Life of Antony and the Letter To Marcellinus*, Mahwah, N.J.: Paulist Press.

Hamilton 2006 Hamilton, Alastair. *The Copts and the West, 1439-1822 the European Discovery of the Egyptian Church*. Oxford: Oxford University Press, 2006. Chapter 12.

Hodgins 2014 Hodgins, G., 2014. "Accelerated Mass Spectrometry Radiocarbon Determination of Papyrus Samples". *Harvard Theological Review*, 107(02), pp.166–169.

Kalvesmaki 2014 Kalvesmaki, J., 2014. "Canonical References in Electronic Texts: Rationale and Best Practices". *Digital Humanities Quarterly*, 8(2). Available at: http://www.digitalhumanities.org/dhq/vol/8/2/000181/000181.html [Accessed October 19, 2014].

King 2014a King, K.L., 2014a. "'Jesus said to them, 'My wife . . .'': A New Coptic Papyrus Fragment". *Harvard Theological Review*, 107(02), pp.131–159.

King 2014b King, K.L., 2014b. "Response to Leo Depuydt, 'The Alleged Gospel of Jesus's Wife: Assessment and Evaluation of Authenticity'". *Harvard Theological Review*, 107(02), pp.190–193.

Krause and Zeldes 2014 Krause, Thomas & Zeldes, Amir,"ANNIS3: A New Architecture for Generic Corpus Query and Visualization". *Digital Scholarship in the Humanities* 31(1), 118-139.

Layton 2011 Layton, B., 2011. *A Coptic Grammar* 3rd Edition, Rev., Wiesbaden: Harrassowitz.

Le Donne 2013 Le Donne, A., 2013. *The Wife of Jesus: Ancient Texts and Modern Scandals*, Oneworld Publications.

Moretti 2013 Moretti, F., 2013. *Distant Reading* 1 edition., London; New York: Verso.

Mueller 2012 Mueller, M., 2012. "Big Data in the Humanities: Curation, Exploration, Collaboration. In Chicago Colloquium on Digital Humanities & Computer Science 2012". University of Chicago. Available at: http://lucian.uchicago.edu/blogs/dhcs/dhcs-2012-program/ [Accessed May 19, 2014].

NTVMR "NTVMR, New Testament Virtual Manuscript Room". Available at: http://ntvmr.uni-muenster.de/ [Accessed October 21, 2014].

Orlandi 2002 Orlandi, T., 2002. "The Library of the Monastery of Saint Shenute at Atripe". In *Perspectives on Panopolis: an Egyptian Town from Alexander the Great to the Arab Conquest*. Leiden: Brill, pp. 211–231.

Robinson 2012 Robinson, A., 2012. *Cracking the Egyptian Code: The Revolutionary Life of Jean-Francois Champollion*, Oxford University Press.

Robinson and Halton 2012 Robinson, G. & Halton, C., 2012. "Gesine Robinson on the 'Jesus Wife' Fragment". *Charles Halton*. Available at: http://awilum.com/?p=2216 [Accessed July 22, 2015].

SNAP:DRGN SNAP:DRGN, Standards for Networking Ancient Prosopographies | Data and Relations in Greco-roman Names. *Standards for Networking Ancient Prosopographies*. Available at: http://snapdrgn.net/ [Accessed October 21, 2014].

Schmid 1994 Schmid, H., 1994. "Probabilistic Part-of-Speech Tagging Using Decision Trees". In *Proceedings of International Conference on New Methods in Language Processing, Manchester, UK*. International Conference on New Methods in Language Processing. Manchester.

Schroeder 2006 Schroeder, C.T., 2006. "Prophecy and Porneia in Shenoute’s Letters: The Rhetoric of Sexuality in a Late Antique Egyptian Monastery". *Journal of Near Eastern Studies*, 65/2, pp.81–97.

Shenoute Shenoute, Österreichische Nationalbibliothek Papyrussammlung K 09662, Codex MONB.XU. Available at: http://aleph.onb.ac.at/F/3VFYPENVSXMVKY61VGLCK78L7I5XDXPUQD98ETMUS4DR8VGNQM-00415?func=find-b&find_code=WRD&adjacent=N&request=K+9662 [Accessed October 21, 2014].

Shenoute 2014 Shenoute, 2014. "Abraham Our Father (Electronic, Coptic SCRIPTORIUM)". *scriptorium (ANNIS Corpus Search)*. Available at: http://corpling.uis.georgetown.edu/annis/scriptorium#_c=c2hlbm91dGUuYWJyYWhhbS5vdXIuZmF0aGVy [Accessed October 21, 2014].

Shisha-Halevy 1986 Shisha-Halevy, A. 1986. *Coptic Grammatical Categories. Structural Studies in the Syntax of Shenoutean Sahidic*. Rome: Pontificum Institutum Biblicum.

Suciu 2012 Suciu, A., 2012. "What is Clavis Coptica?" *AlinSuciu.com*. Available at: http://alinsuciu.com/2012/10/08/what-is-clavis-coptica/ [Accessed October 21, 2014].

TEI "TEI, TEI: Text Encoding Initiative". Available at: http://www.tei-c.org [Accessed May 19, 2014].

TLA 2014 TLA, 2014. Thesaurus Linguae Aegyptiae. Available at: http://aaew.bbaw.de/tla/ [Accessed May 19, 2014].

Till 1960 Till, W.C., 1960. "La séparation des mots en copte". *Bulletin de l’Institut français d’archéologie orientale*, 60, pp.151–70.

Trismegistos "Trismegistos". Available at: http://www.trismegistos.org/ [Accessed May 19, 2014].

Tuross 2014 Tuross, N., 2014. "Accelerated Mass Spectrometry Radiocarbon Determination of Papyrus Samples". *Harvard Theological Review*, 107(02), pp.170–171.

Veilleux 1980 Veilleux, A., 1980. *Pachomian Koinonia, Volume One: The Life of Saint Pachomius and His Disciples*, Kalamazoo: Cistercian Publications.

Ward 1975 Ward, B. ed., 1975. *The Sayings of the Desert Fathers: The Alphabetical Collection*, Kalamazoo: Cistercian Publications.

Wernimont 2013 Wernimont, J., 2013. "Whence Feminism? Assessing Feminist Interventions in Digital Literary Archives". *Digital Humanities Quarterly*, 7(1).

Wilkins 2012 Wilkins, M., 2012. "Canons, Close Reading, and the Evolution of Method". In M. K. Gold, ed. *Debates in the Digital Humanities*. Minneapolis: Univ Of Minnesota Press, pp. 249–258.

Witmore 2012 Witmore, M., 2012. "Text: A Massively Addressable Object". In M. K. Gold, ed. *Debates in the Digital Humanities*. Minneapolis: Univ Of Minnesota Press.

Wortley 2014 Wortley, J. ed., 2014. *The Anonymous Sayings of the Desert Fathers*, Cambridge: Cambridge University Press.

Yardley and Hagadorn 2014 Yardley, J.T. & Hagadorn, A., 2014. "Characterization of the Chemical Nature of the Black Ink in the Manuscript of The Gospel of Jesus’s Wife through Micro-Raman Spectroscopy". *Harvard Theological Review*, 107(02), pp.162–164.

Zeldes, Ritz, Lüdeling, and Chiarcos 2009 Zeldes, Amir, Ritz, Julia, Lüdeling, Anke and Chiarcos, Christian (2009). "ANNIS: A Search Tool for Multi-Layer Annotated Corpora". In: *Proceedings of Corpus Linguistics 2009*. Liverpool, UK. Available at: http://ucrel.lancs.ac.uk/publications/cl2009/ [Accessed September 10, 2012].

Čéplö 2012 Čéplö, S., 2012. tahime. *bulbulistan*. Available at: http://blog.bulbul.sk/2012/09/tahime.html#more [Accessed July 22, 2015].